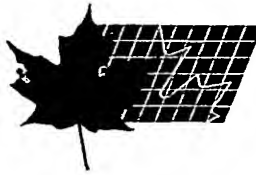


OPIC
OFFICE DE LA PROPRIÉTÉ
INTELLECTUELLE DU CANADA



CIPO
CANADIAN INTELLECTUAL
PROPERTY OFFICE

Ottawa Hull K1A 0C9

(21) (A1)

2,114,350

(22)

1994/01/27

(43)

1995/07/28

(51) INTL.CL.⁵ C05F-017/00; C05F-009/00;

(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Compost Process Air Recirculation and Reuse

(72)

(71) Savoy Enterprises Ltd. - Canada ;

(57) 4 Claims

Notice: This application is as filed and may therefore contain an incomplete specification.



Industrie Canada Industry Canada

3488

Canada

2114350

SAVOY ENTERPRISES LTD.

PATENT APPLICATION

For

"Compost Process Air Recirculation And Reuse"

ABSTRACT

This patent application submitted by Savoy Enterprises Ltd. pertains to the composting of municipal solid waste and/or biosolids (sewage sludges) and the related removal of noxious or offensive odors, if they exist, from the composting process air leaving or being expelled from the material being composted.

Aerated Static Pile, Agitated Bin or Bay (hereinafter referred to as Bay) or Aerated Windrow Composting noxious or offensive odors in the air emissions from the composting process are controlled by using some of the material being composted as a biofilter for control of odor from the compost process air that is being recirculated through the composting material. Combining composting and biofiltration of recirculated process air reduces the amount of fresh process or make-up air required from the atmosphere outside of the composting structure and correspondingly the amount of air leaving the composting facility that might require external processing for odor reduction.

The total composting area is physically separated into zones to minimize the comingling and mixing of the air in the building or structure in which the material to be composted is placed. The air above the separated bays with the fresh or new material to be composted is collected and transported via ducts or piping to the separated bays that contain material that is approaching the

2114350

advanced stages of composting in the structure and used as the process air supply in these advanced stage composting areas. The amount of air to be recirculated through the composting material within the composting building or structure could vary between 90+ percent to 10- percent of the total process air requirements, depending on the characteristics of the material to be composted and the period of time established for composting at separate facilities, thereby reducing the amount of fresh make-up air by 90+ to 10- percent and correspondingly reducing the amount of air that might require external odor control processing.

SPECIFICATION

This patent application pertains to a proposed improvement and modification of the aerated static pile, agitated bay or aerated windrow composting processes of municipal solid waste, compostable industrial wastes, yard waste and biosolids (sewage sludge) or any combination of the above materials that are enclosed in a building or structure.

Currently aerated static pile, agitated bay or aerated windrow composting processes are conducted in: 1) the open; 2) under open-walled structures; or in 3) closed-wall buildings or structures that do not have separated, segregated or partitioned areas above the composting material. The current practice of generally permitting the air in the building or structure in which the composting is taking place to mix in the areas above the composting material usually results in extensive and/or expensive external noxious or offensive odor removal equipment and/or procedures which could include single, dual or even multi-stage chemical air-scrubbing.

In situations 1) and 2) above, any offensive or noxious odors that may emanate from the compost process are extremely difficult, if not impossible to control and eliminate or rectify since the air emanating from the composting material is discharged directly to the atmosphere. In situation 3) cited above, if offensive or noxious odors should develop or occur during the composting process the volume of air to be processed through an adequate odor control, air

remediation, chemical air scrubbing or biofilter system can be dramatically reduced due to the recirculation of air within the structure, as process air, where the composting process is taking place. The volume of air requiring processing for odor remediation or removal will be reduced to that volume of air that is required as external make-up air within the structure where the composting is taking place. The amount of air to be recirculated through the composting material within the composting building or structure could vary between 90+ percent to 10- percent of the total process air requirements, depending on the characteristics of the material to be composted and the period of time established for composting at separate facilities, thereby reducing the amount of fresh make-up air by 90+ to 10- percent and correspondingly reducing the amount of air that might require external odor control processing.

The percentage of process air that may be recirculated within the composting structure will vary with each composting facility. Items to be considered include but are not necessarily limited to the characteristics of the material to be composted, local temperature and relative humidity and will have to be determined on a case by case basis through actual operations.

The implementation of the modified/improved composting/odor control system that is the subject of this patent application is further described and depicted in the attached three (3) drawings which are part of this patent application. The agitated bay system for composting is completely enclosed within a building or structure, (See Figure 1) the individual bays are isolated or separated from one another by bay walls (See Figure 2 and Figure 3) and above bay walls by plastic strips that hang vertically, and horizontal plastic sheets, being suspended from the structural members supporting the building roof (See Figures 1 and 4). The vertical plastic strips overlap one another to greatly reduce the flow or comingling of air between the zones above the composting material in each bay. The vertical plastic strips are flexible enough to permit the passage of equipment that periodically transfers the composting material to adjacent bays. After passage of the compost transfer equipment the plastic strips return to their original vertical,

overlapping position. Plastic sheets are also suspended from the roof structural members to contain the process air. The partitioning or enclosing of the zones above the composting bays essentially contains and isolates the volume of air which may contain noxious or offensive odors in each zone. Removal and recirculation of the air from the zones with early stage composting material and using it as the process air supply for the advanced or latter stages of composting taking place in the bays reduces the overall amount of air that will require external chemical scrubbing or some other form of processing to remove noxious or offensive odors, in the event such odors have been generated during the composting process. Recirculation of process air, which usually has a high moisture content, through the composting material reduces the rate of drying of the composting material in the bottom of the composting bays and can enhance the composting process.

Air injected into the initial composting bays is withdrawn from the zones above the bays via ducts connected to vacuum blowers and then reinjected as the process air supply in bays containing the more advanced or latter stage composting material. The air from the final composting bay(s) is then discharged or expelled to the atmosphere or passed through external air scrubbing equipment if noxious or offensive odors exist and must be removed. The reuse of air from the zones above the initially composting material utilizes the advanced or later stage composting material as a biofilter. The net effect is a significant reduction in the volume of air that may require external biofiltration, chemical scrubbing or other odor removal process..

The air recirculation and reuse process proposed in this patent application can significantly reduce the amount of capital equipment and associated installation costs, particularly in larger composting facilities. In addition there could be: 1) Reduced costs due to reduced quantities of chemicals that would be used in a chemical air scrubbing system; 2) Reduced power costs to operate the external air scrubbing system; and 3) Reduced operational and maintenance costs.

In the drawings which illustrate the embodiments of the invention, Figure 1 is a Perspective View of a typical Agitated Bay System Layout. (The number and dimensions of bays would vary for each facility.) The Plastic Air Segregation Strips would normally hang vertically from the structural roof supports and make contact with the top of the dividing walls between the bays containing the material to be composted. Fixed partitions or plastic sheets (if necessary) would be installed above the plastic strips to maintain the integrity of isolation of each area or zone above each bay. The equipment that would be used to transfer the composting material from each bay to the next would proceed along each bay and its discharge chute would deflect the plastic strips as it passed, discharging the composting material into the adjacent bay permitting the plastic strips to return to their original vertical, overlapping position. The plastic strips at the ends of the bays would extend to the floor to maintain the integrity of each zone associated with each bay, while still permitting the easy passage of the compost transfer equipment.

Figure 2 and Figure 3 illustrates a typical Plan View and Section of an Agitated Bay Composting Facility.

Figure 4 illustrates the flow of fresh make-up air into the material to be composted and the flow of air after passing through the composting material into the process air exhaust ducts which are connected to vacuum blowers. The exhaust duct system would be fitted with multi-dampers which could be operated in such a manner as to vary the volume of process air that could be recirculated into the bays containing material in the more advanced or latter composting stages or expelled from the composting building or structure to the atmosphere or to an external air scrubbing system for noxious or offensive odor removal, if necessary.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

Claim 1) A process for recirculating a variable amount of the air from a composting procedure back through the material being composted to reduce the amount of fresh make-up air required to carry out the composting process.

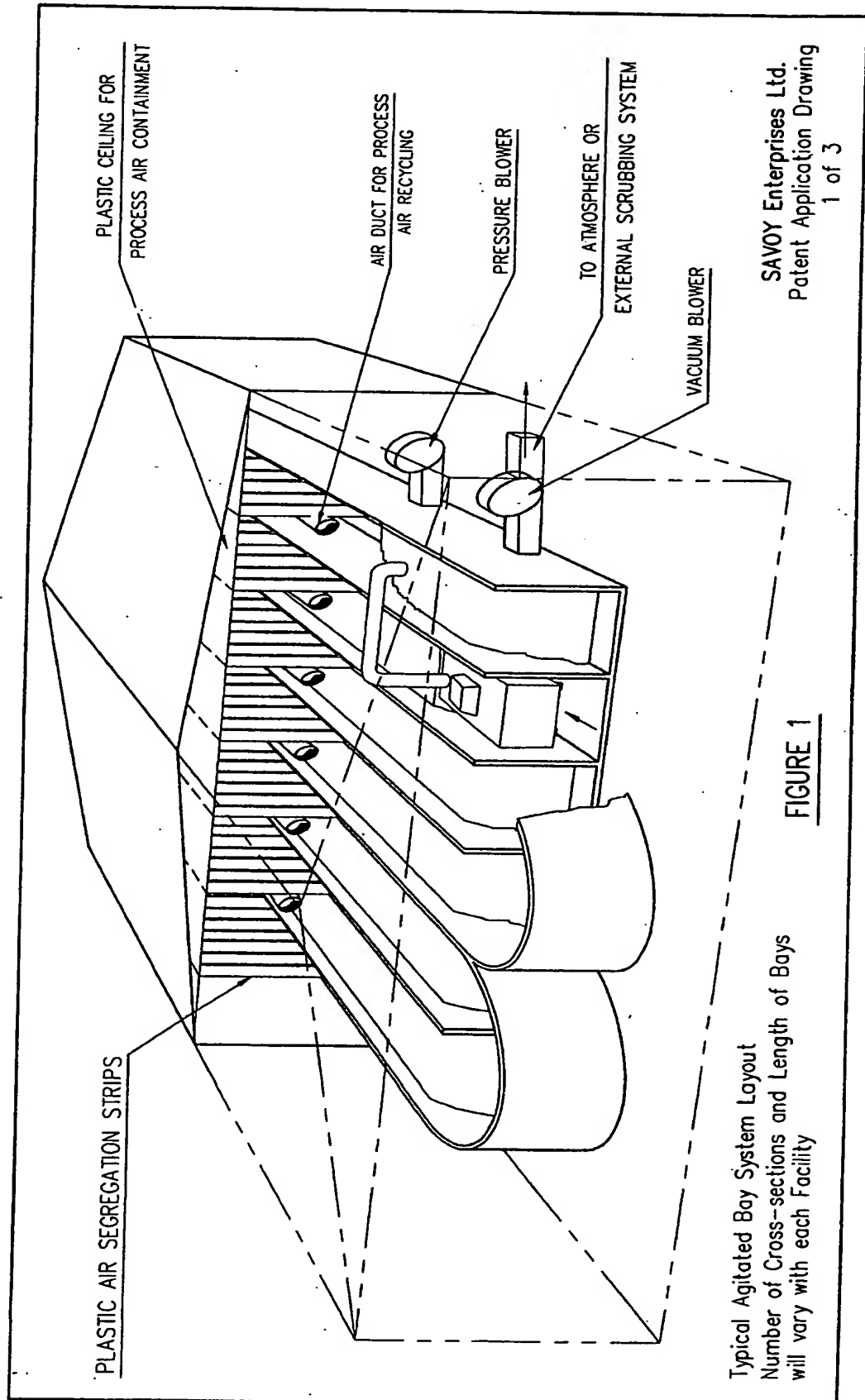
Claim 2) A process as defined in Claim 1, in which noxious or offensive odors generated during the composting process may be reduced or eliminated by recirculating and reusing the air from the early stages of the composting procedure through the material undergoing the more advanced or latter stages of composting, thereby providing the oxygen required for said advanced or latter stage composting, while concurrently using the composting material as a biofilter for the removal of noxious or offensive odors.

Claim 3) A process as claimed in Claim 2 whereby the volume of air expelled from the composting building or structure requiring odor removal (if odor removal is necessary) is reduced to a volume approximately equivalent to the amount of air introduced into the composting process as fresh make-up air, which would vary for each composting facility.

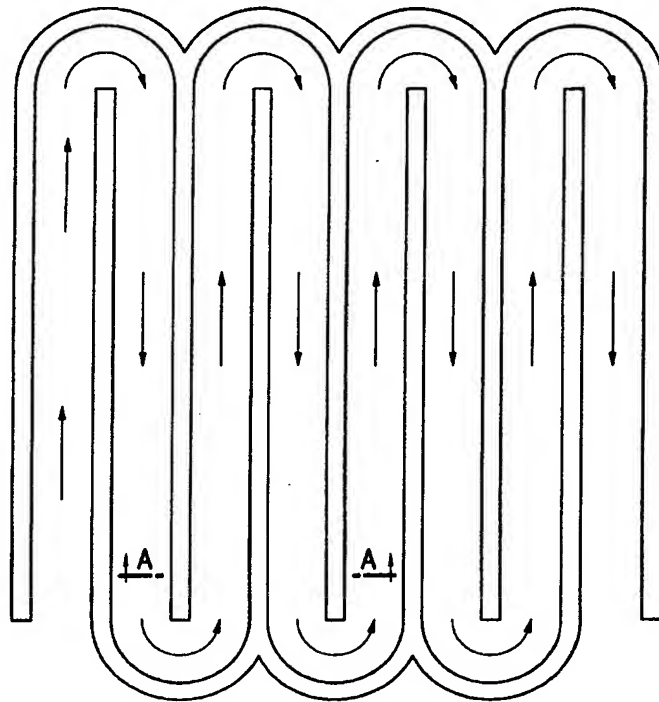
Claim 4) A process as claimed in Claim 1 whereby recirculating composting process air which usually has a high moisture content through the composting material can enhance the composting process.

###

2114350



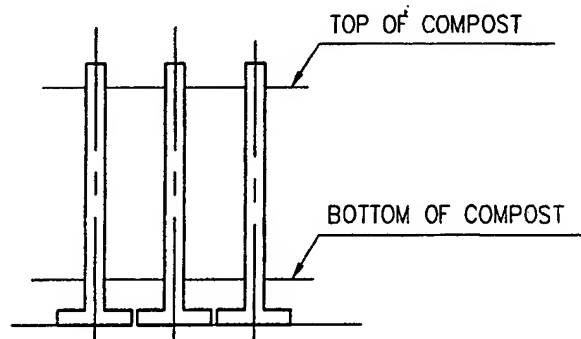
2114350



COMPOSTING BAYS - PLAN VIEW

NUMBER OF BAYS AND SIZE TO VARY WITH EACH FACILITY

FIGURE 2

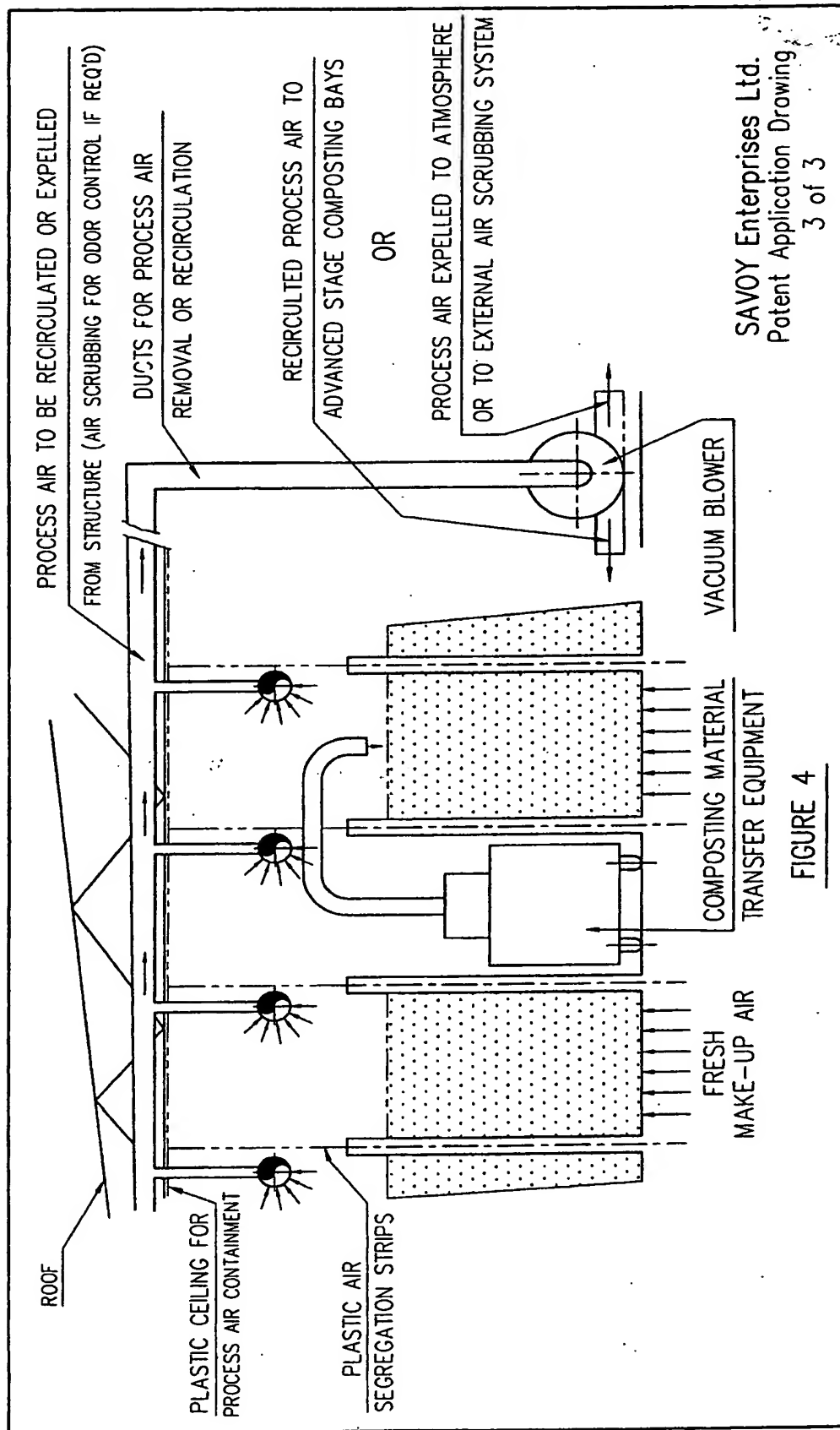


SECTION A - A

FIGURE 3

SAVOY Enterprises Ltd.
Patent Application Drawing
2 of 3

2114350



SAVOY Enterprises Ltd.
 Patent Application Drawing
 3 of 3

FIGURE 4



THIS PAGE BLANK (USPTO)